Animal Industry Report

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Summary

Data describing 220 lots of beef cattle in the Tri-County Steer Carcass Futurity program from 2003 through 2007 were analyzed using a multiple regression statistical model to determine specific factors that influence lot low Choice and above rate and lot premium Choice (Certified Angus Beef©) acceptance rate. Lot low Choice and above rate was similar for years 2005-2007. This rate was significantly lower in 2003 than 2004 but both the 2003 and 2004 rates were similar to the rate in all other years. Lots consisting of heifers had higher (P<.05) low Choice and above rates than lots of steers or mixed-sex pens. The greater the amount of Angus influence in the cattle, the higher the low Choice and above rate (P<.0001). An inverse relationship existed between feedlot in-weight and lot low Choice and above rate; those cattle with lighter feedlot arrival weights had higher % Choice and above rates (P=.0007). Cattle with lower disposition scores (calmer cattle) had higher % Choice and above rates (P=.0496). Low Choice and above rate increased as cattle became less efficient in converting feed to gain (P=.0027). An inverse relationship existed between cost of gain and low Choice and above rate; those cattle with lower cost of gain had higher low Choice and above rates (P=.0043). Lot low Choice and above rate increased as average daily gain increased (P=.0094). Factors examined that did not have a significant effect on lot low Choice and above rate were: mud score at final sort, geographic region of origin, lot mortality rate, number of harvest groups within each lot, days on feed, adjusted final weight, individual treatment cost per head, lot size, and season of harvest.

Lot premium Choice acceptance rate was similar in each year from 2003-2006 but was significantly lower in 2007 compared with all other years. Lots consisting of heifers had higher (P<.05) premium Choice acceptance rates than lots of steers or mixed-sex pens. Cattle harvested during the months October through December had a lower lot premium Choice acceptance rate than those harvested during January through March, April through June, or July through September (P<.05). The greater the amount of Angus influence in the cattle, the higher the lot premium Choice acceptance rate (P<.0064). An inverse relationship existed between feedlot in-weight and lot premium Choice acceptance rate; those cattle with lighter feedlot arrival weights had higher premium Choice acceptance rates (P<.0001). Lot premium Choice acceptance rate increased as average daily gain increased (P=.0003); however lots of cattle that were less efficient at converting feed into gain had higher premium Choice acceptance rates (P<.0104). Factors examined that did not have a significant effect on lot premium Choice acceptance rate were: mud score at final sort, individual treatment cost per head, number of harvest groups within each lot, days on feed, cost of gain, lot size, geographic region of origin, average disposition score, adjusted final weight, and lot mortality rate.

Introduction

Quality grades in beef cattle have been on a slight, but steady decline for the past several years. Beef carcasses that have enough intramuscular fat (marbling) for the Prime grade account for less than 3% of the total harvest matrix in the United States. Only about 17% of black-hided cattle produce beef carcasses with enough marbling to qualify for the upper 2/3 of the Choice grade, which is a requirement for many premium branded beef products like Certified Angus Beef©. Beef carcasses that qualify for Prime and upper 2/3 Choice are rewarded with premiums paid over and above the low Choice and discounts for Select grades. These premiums serve as incentives to cattle feeders to produce more cattle that meet the specifications in demand by consumers.

The objective of this data analysis was to quantify the effects of individual animal traits and feedlot performance measurements describing lots of beef cattle on both lot low Choice and above rate and lot premium Choice acceptance rate. These results could be used to modify feeding practices in an effort to increase quality grades and thus provide additional revenue for cattle feeders.

Materials and Methods

Data on 23,876 head of beef calves fed at ten Iowa feedyards from 2003-2007 were used to determine the factors that affected lot low Choice and above and premium Choice acceptance rates. The cattle, which originated from 15 states, were consigned to the Iowa Tri-County Steer Carcass Futurity program. All calves were weighed within four days of arrival; after 28 to 35 days on feed; at re-implant time, and within five days of harvest. All calves were vaccinated upon arrival, implanted, and placed on a starting feedlot diet. A common dietary energy level was

used at all feedlots. Calves were sorted and harvested when they were visually assessed to have 0.4 inch of fat cover. Upon harvest, detailed carcass data was collected.

Lot low Choice and above rate was calculated by dividing the number of carcasses that graded low Choice or higher by the number of calves in the lot harvested and multiplying by 100. Lot premium Choice acceptance rate was determined by dividing the number of black-hided cattle in the lot by the number of carcasses in the lot that were premium Choice and multiplying by 100. Lot premium Choice acceptance rate was based on the new CAB© requirements.

Two multiple regression models quantifying the effects of independent factors on lot low Choice and above rate and lot premium Choice acceptance rate were developed through a backwards selection procedure. At each step of the backwards selection process, the variable with the largest P value was eliminated from the model. A value of $P < 0.05$ was used to maintain a variable in the model.

Results and Discussion

Lots of beef cattle that were harvested during the years of 2005 to 2007 had similar lot low Choice and above rates (P>.05) that ranged from 69.1 to 72.8% (Table 1). The lot low Choice and above rate for cattle harvested in 2003 was significantly lower than 2004.

Lots of beef cattle that were harvested during the years of 2003 to 2006 had similar lot premium Choice acceptance rates (P>.05) that ranged from 21.2 to 29.9% (Table 2). The lot premium Choice acceptance rate for cattle harvested in 2007 dropped to 11.0% which was significantly lower than any of the previous years. Two factors may have contributed to the decline in lot premium Choice in 2007 while there was not a decline in lot low Choice. First factor was the majority of cattle sold were age verified and no premium Choice premium was paid, therefore, the upper end of the low Choice grade were not railed out for additional cooler time. The second factor may be the severe winter weather conditions experienced from January to March of 2007 in southwest Iowa which resulted in poorer feedlot performance during that time period.

Both lot low Choice and above and lot premium Choice rate were affected by gender (P<.0001). The heifer lots were 80.6% low Choice and above while steer and mixed-sex lots were 67.3 and 67.8%, respectively (Table 3). Lot premium Choice acceptance rate for heifers was nearly twice as high as it was for lot premium Choice than lots of steers or mixed-sex pens (Table 4). Season of harvest was not significant on lot low Choice or above but had a significant effect on lot premium Choice (P<.0001) with the lowest acceptance rates (13.6%) occurring during the time period of October through December (Table 5). All other time periods; January through March, April through June, and July through September, had similar lot premium Choice acceptance rates.

Cattle that were higher percent Angus had higher low Choice and above rates (P<.0001; Table 6). The regression coefficient for this continuous variable was 0.264. So, for every one percent increase in percent Angus, lot low Choice and above rate would be expected to rise by 0.264%. Example: if a pen of steers that was 50% Angus had a low Choice and above rate of 60%; one would expect a group of 75% Angus steers to have a low Choice and above rate of 66.6%, with all other factors being equal.

Cattle that were higher percent Angus had higher premium Choice acceptance rates (P=.0064; Table 7). The regression coefficient for this continuous variable was 0.093. So, for every one percent increase in percent Angus, lot premium Choice acceptance rate would be expected to rise by 0.093%. Example: if a pen of Angus steers that was 50% Angus had a premium Choice acceptance rate of 20%; one would expect a group of 75% Angus steers to have a premium Choice acceptance rate of 22.325%, with all other factors being equal.

Calves that arrived at the feedlot at lighter weights had higher low Choice and above rates (P=.0007, Table 6). For every one pound lower in-weight, lot low Choice and above rate increased by 0.052%. As an example, if a pen of 600 lb steers had a low Choice and above rate of 60%, one would expect a group of 500 lb steers to have an acceptance rate of 65.2%, with everything else being equal.

Calves that arrived at the feedlot at lighter weights had higher premium Choice acceptance rates (P<.0001, Table 7). For every one pound drop in in-weight, lot premium Choice acceptance rate increased by 0.066%. As an example, if a pen of 600 lb steers had a premium Choice acceptance rate of 20%, one would expect a group of 500 lb steers to have an acceptance rate of 26.6%, with everything else being equal.

Lot low Choice and above rate increased as lot disposition score lowered (the cattle were more docile) (P=.0007, Table 6). The regression coefficient for this variable was -5.804, meaning for every 1 score decrease in disposition score, lot low Choice and above rate rose 5.804%. Example: if a group of steers had an average disposition score of 2.2 and a 60% low Choice and above rate, one would expect a group of steers with an average disposition score of 1.2 to have a 65.804% low Choice and above rate.

Lot low Choice and above rate increased as cost of gain lowered (P=.0043, Table 6). The regression coefficient for this variable was -0.638, meaning for every $1/cwt of cost of gain the lot low Choice and above rate rose 0.638%. Example: if a group of steers had an average cost of gain of $70/cwt of gain and a 60% low Choice and above rate, one would expect a group of steers with an average disposition score of $68/cwt of gain to have a 61.28% low Choice and above rate.

Lot low Choice and above rate increased as lot average daily gain increased (P=.0094, Table 6). The regression coefficient for this variable was 11.678, meaning for every 1

lb increase in average daily gain, lot low Choice and above rate rose 11.678%; or for every 0.1 lb increase in ADG, % low Choice and above would rise 1.1678%. Example: if a group of steers had an ADG of 3.5 lb/d and a 60% low Choice and above rate, one would expect a group of steers gaining 3.6 lbs per day to have a 61.2% low Choice and above rate.

Lot premium Choice acceptance rate increased as lot average daily gain increased (P=.0003, Table 7). The regression coefficient for this variable was 14.503, meaning for every 1 lb increase in average daily gain, lot premium Choice acceptance rate rose 14.503%; or for every 0.1 lb increase in ADG, % premium Choice would rise 1.4503%. Example: if a group of steers had an ADG of 3.5 lb/d and a 20% acceptance rate, one would expect a group of steers gaining 3.6 lbs per day to have a 21.4% acceptance rate.

Lot low Choice and above rate also increased as cattle became less efficient in converting feed to gain (P=.0027, Table 6). For each one pound increase in the amount of feed required to produce one pound of gain, lot low Choice and above rate increased 6.908%. Example: if a group of steers that had a 6:1 feed:gain had a 60% low Choice and above rate, one would expect a group of steers with a 7:1 conversion rate to have a low Choice and above rate of 66.9%.

Lot premium Choice acceptance rate also increased as cattle became less efficient in converting feed to gain (P=.0104, Table 7). For each one pound increase in the amount of feed required to produce one pound of gain, lot premium Choice acceptance rate increased 4.77%. Example: if a group of steers that had 6:1 feed:gain had a 20% premium Choice acceptance rate, one would expect a group of steers with a 7:1 conversion rate to have a premium Choice acceptance rate of 24.8%.

Those factors evaluated that did not have a significant (P>.05) effect on lot low Choice and above rate included: mud score at final sort, geographic region of origin, lot mortality rate, number of harvest groups within each lot, days on feed, adjusted final weight, individual treatment cost per head, lot size, and season of harvest.

Those factors evaluated that did not have a significant (P>.05) effect on lot premium Choice acceptance rate included: mud score at final sort; individual treatment cost per head; number of harvest groups within each lot; days on feed; cost of gain; lot size,; geographic region of origin; average disposition score; adjusted final weight, and lot mortality rate.

Table 1. Effect of Year of Harvest on Lot Low Choice and Above Rate in the Tri-County Steer Carcass Futurity.

Year	No. of Lots	LSM of Lot Acceptance Rate	Regression coefficient	P-Value
2003	64	68.0%[a]	-3.6	.0051
2004	34	78.0%[b]	6.4	
2005	14	72.8%[ab]	1.2	
2006	55	69.1%[ab]	-2.5	
2007	51	71.6%[ab]	0.0	

[ab] Means with unlike superscripts differ (P<.05).

Table 2. Effect of Year of harvest on Lot Premium Choice Acceptance Rate in the Tri-County Steer Carcass Futurity.

Year	No. of Lots	LSM of Lot Acceptance Rate	Regression coefficient	P-Value
2003	64	24.7%[a]	13.7	<.0001
2004	34	24.3%[a]	13.3	
2005	14	29.9%[a]	18.9	
2006	57	21.2%[a]	10.2	
2007	51	11.0%[b]	0.0	

[ab]Means with unlike superscripts differ (P<.05).

Table 3. Effect of Gender on Lot Low Choice and Above Rate in the Tri-County Steer Carcass Futurity.

Gender of Calves	No. of Lots	LSM of Lot Acceptance Rate	Regression Coefficient	P- Value
Heifers	43	80.6%[a]	12.8	<.0001
Steers	115	67.3%[b]	-0.5	
Mixed-sex pens	60	67.8%[b]	0.0	

[ab]Means with unlike superscripts differ (P<.05).

Table 4. Effect of Gender on Lot Premium Choice Acceptance Rate in the Tri-County Steer Carcass Futurity.

Gender of Calves	No. of Lots	LSM of Lot Acceptance Rate	Regression Coefficient	P- Value
Heifers	44	31.7%[a]	13.6	<.0001
Steers	116	16.9%[b]	-1.2	
Mixed-sex pens	60	18.1%[b]	0.0	

[ab]Means with unlike superscripts differ (P<.05).

Table 5. Effect of Season of Harvest on Lot Premium Choice Acceptance Rate in the Tri-County Steer Carcass Futurity.

Season of Harvest	No. of Lots	LSM of Lot Acceptance Rate	Regression coefficient	P-Value
January-March	64	27.0%[a]	13.4	<.0001
April-June	117	25.7%[a]	12.1	
July-September	17	22.6%[a]	9.0	
October-December	22	13.6%[a]	0.0	

[ab]Means with unlike superscripts differ (P<.05).

Table 6. Regression Coefficients for Continuous Variables Affecting Lot Low Choice and Above Rate in the Tri-County Steer Carcass Futurity.

Factor	No. of Lots	Regression Coefficient	P-Value
Percent Angus	218	0.264	<.0001
Delivery Weight, lbs	218	-0.052	.0007
Disposition Score[c]	218	-5.804	.0496
Pounds of feed per pound of gain	218	6.908	.0027
Cost of gain $/cwt	218	-0.638	.0043
Overall average daily gain	218	11.678	.0094

[c] A disposition score was given to each calf at on –test weight, re-implant, at first sort and at second sort when appropriate and these scores were used to calculate an average disposition score. Disposition scores were defined as follows: 1 = docile, 2 = restless 3 = nervous, 4 = flighty (wild), 5 = aggressive and 6 = very aggressive.

Table 7. Regression Coefficients for Continuous Variables Affecting Lot Premium Choice Acceptance Rate in the Tri-County Steer Carcass Futurity.

Factor	No. of Lots	Regression Coefficient	P-Value
Percent Angus	220	0.093	.0064
Delivery Weight, lbs	220	-0.066	<.0001
Pounds of feed per pound of gain	220	4.770	.0104
Overall average daily gain	220	14.503	.0003

Implications

The ability of cattle feeders to capture market premiums for the high-quality beef market is enhanced when genetic and management factors affecting carcass quality can be more accurately ascertained when cattle are placed on feed. These data indicate that factors that impact lot low Choice and above rate are similar to factors that impact premium Choice rate. Those factors identified in this data analysis include heifers as compared to steers, cattle placed on feed at lighter weights, more docile cattle and cattle with a higher percentage Angus cattle achieve higher lot low Choice and above and higher lot premium Choice rates without sacrificing feedlot performance measures.